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DEPARTMENT OF COMMERCE

National Institute of Standards and Technology

[Docket No. 170804731-7731-01]

Building the Foundations for Quantum Industry

AGENCY: National Institute of Standards and Technology, Department of Commerce.

ACTION: Notice; Request for Information (RFI).

SUMMARY: The National Institute of Standards and Technology (NIST) requests information about the broader needs of the industrial community in the area of quantum information science (QIS). NIST seeks input from stakeholders regarding opportunities for research and development, means and methods of inducing interaction and collaboration, providing support for emerging market areas, identifying barriers to near-term and future applications, and understanding workforce needs. As part of this effort, NIST will hold a workshop on Thursday, October 5, 2017. The information received in response to this RFI and during the workshop will inform recommendations for the

development and coordination of U.S. Government policies, programs, and budgets to advance U.S. competitiveness in QIS.

DATES:

For Comments: Comments must be received by 5:00 PM Eastern Time on [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

Written comments in response to the RFI should be submitted according to the instructions in the SUPPLEMENTARY INFORMATION section below.

For Workshop: The Workshop on Building the Foundations for Quantum Industry will be held on Thursday, October 5, 2017 from 9:00 a.m. to 5:00 p.m. Eastern Time.

Attendees must register by 5:00 PM Eastern Time on September 29, 2017.

ADDRESSES:

For Comments: Written comments may be submitted only by email to Dr. Jacob Taylor at qid@nist.gov in any of the following formats: ASCII; Word; RTF; or PDF. Please include your name, organization's name (if any), and cite "Building the Foundations for Quantum Industry RFI" in the subject line of all correspondence. All comments will be made publicly available at https://www.nist.gov/news-events/events/2017/10/quantum-industry-day_as_submitted. Accordingly, proprietary or confidential information should not be included in any comments, as they will be posted without change.

For Workshop: The workshop will be held at NIST, 100 Bureau Dr., Gaithersburg, MD, 20899. Please note admittance instructions under the SUPPLEMENTARY INFORMATION section of this notice. To register, go to: <https://www.nist.gov/news->

events/events/2017/10/quantum-industry-day. Additional information about the workshop will be available at this web address as the workshop approaches.

FOR FURTHER INFORMATION CONTACT: Kimberly Emswiler, Jacob Taylor, or Carl Williams by email at qid@nist.gov, or Kimberly Emswiler by phone at (301) 975-4208. Please direct media inquiries to NIST's Office of Public Affairs at (301) 975-2762.

SUPPLEMENTARY INFORMATION:

Background: Twenty five years of research and development work in QIS is producing dramatic new commercial opportunities domestically, including the first niche applications. There is also an increasing level of international activity and investment in the field. NIST is requesting this information and holding the workshop in support of the Interagency Working Group (IWG) on QIS of the National Science and Technology Council, Committee on Science, Subcommittee on Physical Sciences. The IWG was chartered in October 2014 to develop and coordinate policies, programs, and budgets for QIS research and development, and to further develop the scientific basis, infrastructure, future technical workforce, and intellectual property that will be required to address agency missions and secure future U.S. competitiveness in QIS. The IWG includes participants from the Departments of Commerce, Defense, and Energy; the Office of the Director of National Intelligence; and the National Science Foundation. In 2016, the IWG published an initial report identifying key challenges for emerging quantum

industry, including: institutional boundaries, education and training, technology development, and levels and stability of funding.

Request for Information:

NIST seeks input from stakeholders regarding opportunities for research and development, emerging market areas, barriers to near-term and future applications, and workforce needs. The objective of this RFI is to gather facts that will assist the IWG's formation of recommendations for the development and coordination of U. S.

Government policies, programs, and budgets to advance U.S. competitiveness in QIS.

The questions below are intended to assist in the formulation of comments and should not be construed as a limitation on the number of comments that interested persons may submit or the issues that may be addressed in such comments. Comments containing references, studies, research, and other empirical data that are not widely published should include copies of the referenced materials. As noted above, all comments will be made publicly available as submitted; therefore proprietary or confidential information should not be included. NIST is specifically interested in receiving input pertaining to one or more of the following questions:

1) Identification of opportunities

QIS includes, for example, quantum computing and processing, quantum algorithms and programming languages, quantum communications, quantum sensors, quantum devices, single photon sources, and detectors. What areas of pre-competitive QIS research and development appear most promising? What areas should be the highest priorities for Federal investment? What are the emerging frontiers? What methods of monitoring new

developments are most effective? What market areas are well-positioned to benefit from new developments in QIS? Where will a technology perspective study help most? Where are roadmaps useful for coordination?

2) Surmounting challenges

The 2016 report “Advancing Quantum Information Science: National Challenges and Opportunities”¹ identified institutional boundaries and knowledge transfer challenges, as well as workforce needs across the emerging quantum industry. To what extent are these challenges addressable by the formation of consortia? May they be addressed with structured academic-commercial or commercial-governmental interactions? What potential collaborative structures might industry adopt to best address these challenges?

3) Funding and knowledge considerations

Uncertain market needs, imperfect investment levels and mechanisms, undeveloped technology, challenges in dissemination of information, and technology transfer are some of the potential barriers to adoption of QIS technology. What are the greatest technical and organizational barriers to advancing important near-term and future applications of QIS and what should be done to address these barriers? What methods might be adopted to encourage both small and large efforts to provide a healthy industrial base? Which areas are underfunded, inconsistently funded, or need better funding clarity from the government for progress of the industry as a whole? At what level of knowledge or development should intellectual property move from being freely available to exclusive?

¹https://obamawhitehouse.archives.gov/sites/whitehouse.gov/files/images/Quantum_Info_Sci_Report_2016_07_22%20final.pdf

How can industry or government address these concerns?

Workshop:

The purpose of the workshop is to convene stakeholders in the development and commercialization of quantum technologies to address the identified key challenges via industrial, academic, and governmental means. Topics to be discussed include opportunities for research and development and means and methods of facilitating interaction and collaboration such as creation of consortia, providing support for emerging market areas, identifying barriers to near-term and future applications, and understanding workforce needs. Information gathered at this workshop will be used in the development and coordination of U. S. Government policies, programs, and budgets to advance U.S. competitiveness in QIS. Furthermore, this workshop will provide a discussion place for industry to consider methods of collaboration in a neutral setting, including the potential benefits of developing a technology perspective study as well as other helpful organizing elements, including consortia and future roadmap development for subfields.

This workshop will focus on addressing the key challenges described above under “Request for Information.” It will include invited presentations by leading experts from academia, industry, and government; time for group discussion; and breakout sessions for discussing subfields, potential consortia frameworks, and the role of technology perspective studies.

There is no cost for participating in the workshop. No proprietary information will be accepted, presented or discussed as part of the workshop, and all information accepted, presented or discussed at the workshop will be in the public domain.

All workshop participants must pre-register at the following web address to be admitted: <https://www.nist.gov/news-events/events/2017/10/quantum-industry-day>. Anyone wishing to attend this meeting must register by 5:00 PM Eastern Time on September 29, 2017, in order to attend. Also, please note that federal agencies, including NIST, can only accept a state-issued driver's license or identification card for access to federal facilities if such license or identification card is issued by a state that is compliant with the REAL ID Act of 2005 (Pub. L. 109-13), or by a state that has an extension for REAL ID compliance. NIST currently accepts other forms of federally-issued identification in lieu of a state-issued driver's license. For detailed information please contact Kimberly Emswiler at (301) 975-4208 or visit: http://www.nist.gov/public_affairs/visitor/.

Authority: 15 U.S.C. 272(b)(1), (4), (11) & 15 U.S.C. 272(c)(12).

Kevin Kimball
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